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Renormalization of the elementary excitations in hole- and electron-doped cuprates due to spin fluctuations

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Abstract

Extending our previous studies we present results for the doping, momentum, frequency, and temperature dependence of the kinklike change of the quasiparticle velocity resulting from the coupling to spin fluctuations. In the nodal direction a kink is found in both the normal and superconducting state while in the antinodal direction a kink occurs only below Tc due to the opening of the superconducting gap. A pronounced kink is obtained only for hole-doped, but not for electron-doped cuprates and is characteristically different from what is expected due to electron-phonon interaction. We further demonstrate that the kink structure is intimately connected to the resonance peak seen in inelastic neutron scattering. Our results suggest similar effects in other unconventional superconductors like Sr2RuO4.